



Ambiente & Sociedade

ISSN: 1414-753X

revista@nepam.unicamp.br

Associação Nacional de Pós-Graduação e
Pesquisa em Ambiente e Sociedade
Brasil

MASSARANI, LUISA; POLINO, CARMELO; CORTASSA, CARINA; FAZIO, MARÍA EUGENIA; VARA,
ANA MARÍA

O QUE PENSAM OS PEQUENOS AGRICULTORES DA ARGENTINA SOBRE OS CULTIVOS
GENETICAMENTE MODIFICADOS?

Ambiente & Sociedade, vol. XVI, núm. 3, julio-septiembre, 2013, pp. 1-22
Associação Nacional de Pós-Graduação e Pesquisa em Ambiente e Sociedade
Campinas, Brasil

Available in: <http://www.redalyc.org/articulo.oa?id=31728987002>

- How to cite
- Complete issue
- More information about this article
- Journal's homepage in redalyc.org

redalyc.org

Scientific Information System
Network of Scientific Journals from Latin America, the Caribbean, Spain and Portugal
Non-profit academic project, developed under the open access initiative

WHAT DO SMALL FARMERS IN ARGENTINA THINK ABOUT GENETICALLY MODIFIED CROPS?

LUISA MASSARANI¹, CARMELO POLINO², CARINA CORTASSA³,
MARÍA EUGENIA FAZIO⁴, ANA MARÍA VARA⁵

Introduction

In the context of the discussion of the “new sociology of science” (FRICKEL and MOORE, 2006) and the “commercialization of science”, which has belatedly been included in science and technology social studies (STS), Mirowsky and Sent’s (2008) description stands out as regards the changes that have taken place when they describe a “regime of globalised privatization”, characterized by the privatization of publicly-funded research, transnational trade agreements that add to national controls, the accumulation of human capital by “whoever has the money to pay” and a focus on biomedicine, genetics in informatics and the economy (2008, p. 641 and 655-662).

As regards biotechnology specifically, Heller (2001) highlights the formation of a bio-economy, positing that this represents a new means of production that emerged when

1. National Counsel of Technological and Scientific Development Productivity Fellow – level 1C. Bachelor’s degree in Social Communication from the Pontificia Universidade Católica do Rio de Janeiro (1987), Master’s in Information Science from the Instituto Brasileiro de Informação em Ciência e Tecnologia (1998) and PhD in Biosciences Management, Education and Dissemination from the Universidade Federal do Rio de Janeiro (2001). Works at the Fundação Oswaldo Cruz, part of the Studies on Science Communication at the Museu da Vida (Museum of Life). Supervises Masters and Ph.D. students on the postgraduate course in Biosciences and Health Education at the Instituto Oswaldo Cruz/Fiocruz, History of Science and Health at the Casa de Oswaldo Cruz/Fiocruz and at the Instituto de Bioquímica Médica, Universidade Federal do Rio de Janeiro. Coordinates SciDev.Net (Science and Development Network) for Latin America and the Caribbean (www.scidev.net), site based in London and set up with the support of the journals Nature and Science. Leader of the CNPq Science, Communication and Society Research Group. Email: luisa.massarani3@gmail.com

2. Master in Science, Technology and Society from the Universidad de Oviedo (Spain); Master in Communication and Culture of S&T from the Universidad de Salamanca (Spain); and Masters in STS from the Universidad Nacional de Quilmes (Argentina); PhD program at the Universidad de Oviedo (Spain). Senior Researcher at the Centro REDES (Buenos Aires, Argentina). Email: cpolino@ricyt.edu.ar

3. Ph.D. in Science and Culture, Universidad Autónoma Madrid, Master’s in Science, Technology and Society, Universidad de Salamanca. Researcher at the Centro REDES (Buenos Aires, Argentina). Lecturer and researcher at the Universidad Nacional de Entre Ríos (Argentina). Email: ccortassa@centroredes.org.ar

4. Doctoral candidate at the Universidad de Oviedo (Spain). Researcher in public perceptions of science and scientific culture issues. Email: meugenia.fazio@gmail.com

5. MA in Media Ecology; New York University; PhD in Hispanic Studies, University of California, Riverside. Senior researcher at the Centro de Estudios de Historia de la Ciencia José Babini, Universidad Nacional de San Martín. She does research on science communication, technical and environmental controversies, and the impact of globalization on science and technology. Email: amvara@unsam.edu.ar

capital reached the limits of industrial production and entered what could be called an *organic* phase: a phase in which capital targets the reproductive facets of cultural and biological life as areas for intensifying production and commoditization. In the same vein, Jasanoff (2006) includes new biotechnology and control over seeds in his discussion of imperialism, deeming neo-liberalism a new version of imperialism and biotechnology as a technical-political-social construct that fits this scenario well:

the capacity to engineer the genetic characteristics of plants has blended seamlessly with state and corporate projects of managing human populations so as to legitimate the exercise of power. Both nation-states and, in an era of neo-liberalism, the multinational corporations that states are in league with have displayed their readiness to deploy agricultural biotechnology in advancing their interests on a global scale (JASANOFF, 2006, p. 292).

In this context, some stakeholders are favorably positioned as they are the ones that promote the technologies and are able to influence policy when regulatory frameworks are being negotiated: in particular, transnational corporations. Large-scale producers are also favorably placed among local stakeholders as they are able to incorporate the technologies and pay the respective fees, thus becoming the target consumer for the technologies. On the other hand, small farmers are among those stakeholders who find themselves excluded twice over: from decisions on whether to introduce the technologies (or not) and from the possibility of benefiting from them.

The processes that have led to the privatization of knowledge and the commercialization of science have, moreover, led to heightened critical discourse on the marriage of science, industry and business and, simultaneously, to a more vigilant form of social awareness, whether receptive or in opposition to, as regards the evaluation and management of the risks stemming from technological development. Scientific studies (and this includes those with a more communicative focus) have amassed a wealth of work on how specialized systems, technological developments, industries and governments interact with the mobilization of civil society on experimental or medical and environmental developments (DUNWOODY and GRIFFIN, 2007; CARVALHO, 2007).

Biotechnology has been emblematic in this regard: there have been many and varied studies on social perceptions that document (both in central and peripheral countries) a gradually clearer awareness of the impact of scientific-technological development and the existence of complex attitudes which are contradictory in many regards, which stress the risks as a key dimension in the relationship between science, technological innovation, specialized systems and public policy (DURANT and BAUER, 1998; GASKELL and BAUER, 1999; PRIEST, 2000, 2001; MASSARANI and MOREIRA, 2005). This has shaped debates about science and risk assessment, introducing the notion of the precautionary principle¹ as one of the characteristics when drawing up legislation regulating contemporary public policy (STIRLING, 2007). The issue of environmental and social risk emerges among agricultural producers as part of the broader discussion concerning the impacts of technology on the restructuring of society and the economy.

Genetically modified (GM) crops were introduced in Argentina in the mid-1980s and they were quickly taken up by local farmers. The spread of biotechnology brought about a major change in the country's agricultural production context, spearheading the movement towards a new technology-based paradigm that was supported to a great extent by the corporations involved in developing and marketing GM products and by the National Institute for Agricultural Technology (INTA) (VARA, 2004).

At the time, the impact of biotechnology on developing countries' agricultural productivity, national and international biosafety standards and the potential risks to the environment were the leitmotifs of the fledging debate on GM crops (ALTIERI and ROSSET, 1999; McGLOUGHLIN, 1999; ATKINSON *et al.*, 2001). According to Brooks (2005), the prevalent discourse tended to flag up a series of moral arguments – the same ones as the Green Revolution from 1965 to 1980 – on the potential contribution agro-biotechnology could make to reducing hunger and poverty in developing countries. At the same time, critical discourse stressed, among other concerns, the shortcomings of regulatory frameworks, the potential for these technological innovations to disrupt traditional or indigenous agricultural practices (STONE, 2004) or the increasing threat of social exclusion and inequality for certain groups of farmers (HALL and LANGFORD, 2008).

However, unlike other countries and contexts where some studies are already available on farmers' perceptions of and attitudes towards GM crops, for instance in the United States and Brazil (e.g., c.f. CHIMMIRI *et al.*, 2006; HALL and LANGFORD, 2008; GUEHLSTORE, 2008; ALMEIDA and MASSARANI, 2011), there is a dearth of empirical information on this issue in Argentina. With the exception of some works (SAGPYA, 2003), the majority of local studies related to the issue of GM crops ignore farmers as key players. Farmers have both played an active role in introducing this new technology and have had to interact with it during their daily activities. The objective of this research was to address this paucity of information by examining in depth the different experiences, perceptions and attitudes towards agricultural biotechnology of small farmers in Argentina. This article is part of a project that is supported by the International Development Research Centre, Canada, and by Capes (the Brazilian agency Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, linked to the Ministry of Education).

The local context

With 22.9 million hectares of GM crops planted in 2010, Argentina ranks third in the world: with the United States in pole position (66.8), followed by Brazil (25.4). The lion's share of GM crops in Argentina is made up of soy (19.1 million hectares), followed by cotton (95% of all cotton grown is transgenic) and maize (87%) (JAMES, 2011). Recent figures released by the National Statistics and Census Institute reveal that the "soy complex" - soybeans in granular form, meal for animal feed and soybean oil - currently represents a quarter of the country's overall exportsⁱⁱ.

Immediately after its introduction a decade and a half ago, transgenic soy became a symbol for agro-biotechnology applications in Argentina. The success in the uptake of the Roundup Ready (RR) varieties, which Monsanto created to be resistant to the

herbicide glyphosate, and their combination with no-till methods “marked a decisive point from which this crop began a period of extremely rapid growth” (BEGENSIC, 2002, p. 3). Thereby, soy replaced other crops and was introduced with good results in areas previously deemed unimportant from an agro-ecological viewpoint. The widespread use of RR soy amongst local farmers was chiefly attributed to the fact that it makes daily work easier and yields are lower. Another key factor was that Monsanto failed to patent RR soy in Argentina, which enabled other transnational corporations (like Nidera) and local companies (such as Don Mario, Relmó and La Tijereta) to include this strain among their varieties that were adapted to different areas of the country. Consequently, the price of RR soy remains substantially lower than in the United States (GAO, 2000). In this context, allied to the fact that the patent for glyphosate expired in the mid-1990s, the technological package ended up being a low-cost one for Argentinean producers (e.g. PENNA and LEMA, 2003; TRIGO and CAP, 2003; QAIM and TRAXLER, 2005).

Although GM crop production has rapidly increased over the last decade, GM crops have not been without technical, political and economic controversy, involving different specialists, organizations and regulatory and supervisory government authorities from the very outset. As has occurred with other biotechnology applications, in the case of genetically modified soy, its safety as regards health and the environment has been called into question. It has also been pointed out that the growth of soy monoculture has taken place at the expense of other crops and livestock rearing. Moreover, soy monoculture is said to encourage the concentration of land, expulsion of small farmers, dependence on technology developed by multinational corporations and the intensive use of costly machinery and equipment. Environmental organizations (Foro por la Tierra y la Alimentación and Red Alerta Transgénicos) have warned that the country could become a monoculture-dependent “soybean republic” (VARA, 2005). On this issue, Greenpeace - as well as social movements and NGOs such as the Grupo de Reflexión Rural Movimiento de Campesinos de Santiago del Estero, among others, - have repeatedly stated that soy destroys the environment and that its use as a crop can be seen as a paradigm of the country’s agricultural insecurity.

Moreover, the possible negative impact of glyphosate on rural workers’ health is currently an increasingly important controversy involving scientists, legislators, companies and government representatives (VARA, PIAZ and ARANCIBIA, 2012; ARANCIBIA, forthcoming).

Against this backdrop of declared or latent conflicts, the mass media in Argentina has also covered stories on GM soy. As Polino and Fazio (2005) demonstrated, terms like “biotechnology” and “transgenic” appeared in journalistic discourse at the end of the 1990s and have spread swiftly and continuously. Yet in the same article, the authors reveal the results of a piece of national research where the majority of Argentineans (60%) living in urban areas were not aware of GM soy production in the country. This would suggest that almost a decade after this technology was introduced in Argentina, genetically modified crops were off the radar for a sizeable segment of society.

As regards the possible effects of GM soy on health and the environment, the research revealed that there was no prevailing perception. Personal stances were shared

evenly between four alternatives: those who believed that GM soy was not harmful; people who were sure the opposite was true (at least in terms of the potential); ambivalent people; and those with no opinion. Nevertheless, when asked if they would buy a genetically modified product, the majority of people answered no, saying they would prefer not to buy any transgenic products, even if they were cheaper (POLINO and FAZIO, 2005). This conclusion tallies with the findings of Mucci (2004) and with the moderately negative pre-disposition amongst consumers revealed in research by SAGYPA (2003).

Participants and procedures

This study is part of a larger project researching the social dimensions and public policy-related aspects arising from the uptake of GM crops in Brazil and Argentina.

A qualitative focus-group methodology was used to research small farmers' perceptions of genetically modified crops, which enables information to be collected through members of a group interacting on a given topic (KITZINGER, 1994, 1995; MORGAN, 1997). As such, the advantage it offers is that it is a partially-controlled observation situation that closely resembles a normal conversational exchange, which enables discussions to be enriched with the introduction of aspects that researchers have not foreseen.

Five focal groups were held, with a total of thirty-eight participants, between June and July 2007. The groups varied from five to thirteen ($Av = 7.6$) subjects, who had been selected by being put forward by producer associations, and included farmers with up to one hundred hectares productive land from three Argentinean provinces: Buenos Aires (cities of Pereyra, Bragado and Junín), Chaco (Villa Ángela) and Entre Ríos (Guaaleguay). The criterion of intragroup homogeneity and intergroup heterogeneity was followed in forming the groups with regard to the prevalent type of GM crop among the participants. Intergroup heterogeneity was also planned for when the productive areas to be examined were chosen. In this way the groups were set up in such a manner as to represent the diversity of economic and social characteristics of the agricultural regions of Argentinaⁱⁱⁱ and producers' experiences with different applications of GM products (Table 1).

Meetings were held in rooms located in the participants' communities and the sessions lasted one and a half hours on average.

Table 1. Group composition

Group	Province	City	Main crop	Size
1	Buenos Aires	Pereyra	Horticulture	13
2	Buenos Aires	Bragado	Soy	7
3	Buenos Aires	Junín	Soy	6
4	Chaco	Villa Ángela	Cotton	7
5	Entre Ríos	Guaaleguay	Soy	5

The discussion followed the standard for qualitative procedures, with moderators presenting the main topics and common questions to the groups, steering the conversations in a non-directional manner and avoiding expressing their own points of view.

The dialogues entailed a series of questions on different levels, from those related to biotechnology and genetics in general - which acted as an anchor for farmers' perceptions in particular with regard to GM crops - to others more strictly related to farmers' experience of, information about and attitudes towards their specific crops and the previously-described context. The audio recordings of each session were transcribed in full. The results reported below cover the most significant examples of interventions on: a) knowledge and consumption of genetically modified food; b) the perceived benefits linked to GM crops; c) perception of risks from GM technologies, in particular regarding health and the environment; d) the perception of stakeholders who have benefitted from GM crops; e) the participation of farmers in the decision-making process.

Results

Knowledge of GM crops and attitudes regarding consumption

Significant differences regarding the level of knowledge and the sources of information were noted between groups that use and those who do not use GM crops. Farmers who use GM crops found it easier to remember the time they first heard about them: they mentioned a time frame between 1994 and 1997, encompassing the period in which the authorities allowed genetically modified soy to be grown commercially, which was used for the first time in Argentina for the 1997 harvest. The majority of subjects stated they had first had contact through sales representatives from biotechnology companies. The majority of participants from Bragado, Junín and Gualaguay started growing GM soy as soon as it appeared on the market. For most of them, their first contact came through direct experience, i.e. by growing genetically modified seed as a test. For farmers growing crops other than soy (Villa Ángela), the mass media, word-of-mouth and the Agricultural Federation were the main sources of information on the matter. The majority could not pinpoint exactly when they first heard about GM crops and, when they did specify a date, the date was only a few years before the focal group met.

Producers of GM crops have knowledge about them, at least generally-speaking. Some of them provided a clear definition of GM crops, explaining in their own words the general characteristics and the type of resistance obtained and, in some cases, using basic scientific concepts. Others managed to at least mention "key words", such as "laboratory", "modification" or "gene". However, as the dialogue below shows, farmers with little experience of GM crops generally demonstrated that they were not familiar with the issue, and often were not able to provide a definition. They also confused "GM crops", "genetic improvement" and "hybrid plants", chiefly amongst those with a low level of schooling, who confused "GM crops" with "organic" crops:

“What are transgenic crops? We don’t know...” (1-7)

“*Transgenic, organic*, isn’t it all the same thing? I don’t exactly know what they are...” (1-11)

GM crops were also closely identified with pesticides – a question that received special attention among participants in the Pereyra group, where training is available for those interested in planting crops without pesticides. Even among those most well-informed and familiar with the subject, some confusion may occur, as appears to be the case in the following definition:

“It is a plant modified by man to produce something that is not present in nature. It’s a manipulation. It’s a modification [...] They identified a soy plant that didn’t die and isolated the gene from it. They mapped the ones that were resistant to glyphosate” (2-5).

An interesting comparison was raised in the Villa Ángela group, which defined GM crops as the result and a scientific intervention similar to that used to obtain a test tube baby (term used mainly for the preliminary stages of in vitro fertilization):

“I think it’s like a test tube baby or something similar.” (4-6)

“Exactly: they take the seed and carry out the experiment.” (4-3)

“Did you all know that with test tube babies, you can even know what color the baby’s eyes will be? I think you can know exactly what color, shape, everything will be ...” (4-6)

The association is interesting from a social consciousness point of view as regards how scientists intervene in nature. Although In Vitro fertilization and transgenics are not isomorphic, in both techniques man intervenes to obtain a result that is unavailable using natural processes. Both also raise bioethical issues. The notion of genetic manipulation is part of the debate surrounding In Vitro fertilization, which includes questions such as genetic manipulation to choose the gender of the embryo - and can go even further with therapeutic cloning. It is the concept of human intervention in a laboratory which is stressed in this comparison between transgenic products and test tube babies. The issue of genetic manipulation and the bioethical controversies linked to it were raised at different times in the groups while the consequences for health and the environment were being discussed.

The majority of participants stated they had already consumed GM products or would do so without any fears or preconceptions. More than this, a widespread perception is that these products are so widely available that people consume them without even knowing.

“We all eat them [genetically modified food]!” (2-5)

“Everyone eats genetically modified food. You too [referring to the moderator and the observer].” (2-4)

Benefits of GM crops

The uptake of transgenic seeds in Argentina unleashed a maelstrom of controversy regarding positive and negative issues linked to them, as mentioned before. In particular, the benefits related to their introduction were closely linked to the promise of huge profits stemming from transformative biotechnology. Among the groups, opinions were linked to each person's different experiences with GM crop applications, except with the Pereyra farmers, who had never had any contact with them and therefore based their stances on presumptions. In this group, the benefits were imagined to be possible solutions to problems and difficulties encountered on a daily basis, where the technology could act as a tool to help growers improve the quality of their products:

“Yes, [using GM seeds] might be a good idea if there is another plant that doesn't attract pests, it could be better for us... (...) because the plants are very delicate (...), very fragile... If there were a better plant, it would be cheaper and we could sell it on the market at a lower price.” (1-6)

Those with GM crops stressed that they thought there were specific benefits related to these crops. The economic aspects of land management and the improved productivity play an essential role in their thoughts, as well as the simplification offered by this crop to the process for no-till methods. When they were asked why they decided to grow GM crops, a number of answers shared the same content:

“GM soy is a watershed. (...) Before, we used to use a large number of chemical pesticides to kill the same number of weeds, and even then we didn't kill them. Now, with one chemical pesticide (...), glyphosate, we kill everything. It's much simpler, compared with before. (...) There is a difference in costs in terms of the agricultural labor.” (3-3)

“With glyphosate, it's easier to earn money as you don't have pests taking over... it's much more profitable...” (5-2)

Among the advantages offered by GM soy, different farmers stressed its ability to grow even in adverse conditions. However, many have a different opinion of GM maize. When asked why they still grew traditional maize instead of genetically modified maize, they argued that the seed is cheaper and generally you merely have to monitor the plot to identify any potential pests and if any are identified, you can spray the area with pesticide. Furthermore, according to the farmers, it is not possible to choose between conventional soy and GM soy in Argentina at the moment, stressing that there is no way to go back to conventional soy:

“Traditional soy is not available any more. It is no longer on the market.” (3-4) “You can’t go back. (...) It’s easier, quicker. (...), if we had to go back to the traditional way of growing it, it would be much more expensive and less safe in a number of aspects, the supposed soy revolution would not be possible, which means otherwise it would be much more difficult to colonize areas. (2-3)

As regards the mass uptake of GM crops in Argentina and the process of traditional crops disappearing, some participants - mainly the well-informed and politically active Bragado group – highlighted a combination of factors, such as the clear-cut economic benefits, the country’s situation and the strategies adopted by Monsanto:

“(...) I’d imagine that 95% or 98% of Argentina’s soy is transgenic (...) I would say that maybe they (the multinationals) sell us a package and tie us in to this package, Monsanto perhaps, maybe it isn’t so easy to sell it in other parts of the world with different legislation...” (2-4)
 “It seems that this is the result of a number of factors. In reality, the justification for transgenic products doing so well in Argentina is an economic question. In the context of a country like this, which generally sees a lot of variation, we have the price of agricultural inputs which can change by approximately 30% from one harvest to the next, and thus the chemical pesticide market would become prohibitive for producers. This technology therefore came along, it was very good and we noted that with a lot less money, you could get higher dividends. That’s how this country works, it’s all related to money.” (2-7)

Although the general comments were in favor of the benefits of GM soy, some of the participants highlighted drawbacks that will be reflected on shortly, such as the increased price of seeds and possible risks to health and the environment. In addition, one concern that was raised during the discussions was the reorganization of the social structure as a “collateral effect”: there are ever fewer farmers in the countryside, the number of small farmers has fallen and the land for growing soy is concentrated in all but a few hands, generally large companies that lease or purchase the land.

Risks associated with GM technology (health, environment)

Perception of the risks linked to GM technology did not appear to be clearly defined among the subjects. In fact, few accounts expressed concern in this regard. The feeling of doubt and uncertainty was clearer.

“It seems that as these are organisms with a virus or genes from other things that are resistant to some pesticides and other things, they can produce an imbalance in the human body or in organisms that makes the body more resistant, for instance, to some medicines, some

antibiotics. In other words, they can carry across into the human organism and harm us.” (5-5)

One general characteristic among groups was the discursive overlapping of, on the one hand, the risks associated with GM crops and, on the other, the risks to the environment and health from pesticides. The perception of risks is very clear in this regard and generally there are no doubts about the harm caused by use and abuse of chemical substances on crops. When we asked if there were any risks from growing genetically modified crops, one person answered:

“There are risks, yes. I think they affect nature and the soil. We haven’t observed this here so clearly, but in countries that have been using them for longer, there are serious problems of aquifer contamination. Everything is a chemical substance...” (3-5)

Among the better informed farmers (the Bragado group, for example), an association can be observed between GM crops and pesticides when risks were discussed - in this case, not through overlapping, but as an association (often explicitly mentioned). In the following accounts, participants showed different views of the risks to health:

“I’m not worried about transgenics as a whole because, within transgenics, there are transgenic products that are designed to offer solutions to health problems, both for animals and plants. The major question is the widespread use and lack of control, as we can see with soy (...) when it needs to be sprayed, they spray it, regardless of whether any humans are nearby.” (2-5)

“The question is not ‘to grow or not to grow GM crops’, but what they do to grow GM crops. The chemical substances used, which are tipped on the soil for it to grow, for the soy to grow. They use a lot of things and I don’t know much about them, but the soil is dying. This is due to the chemical substances.” (5-6)

Among the well-informed respondents, different perceptions were identified as to the risks pertaining to specific applications of genetically modified plants:

“I believe that BT is worse than inserting the RR gene as a genetic modification, right? (...) I trust less a modification to insert BT, which kills insects, than inserting a drug that kills nothing, what it does is act as a catalyst to speed up the plant’s calcification. (...) BT produces a substance that kills insects, it is an insecticide. This is much more dangerous. That worries me much more than RR.” (2-7)

We also asked if farmers would plant GM crops if there was scientific evidence of the risks or a legal ban. The majority of the accounts demonstrated more concern with regard to the economic question:

"I think that they [the farmers] will plant them, as they are producers that are much more interested in having a 4 x 4 pick-up truck (...)
(4-3)

"I think that the first thing that they will say is "I'm sorry, what you're saying is correct, but what am I going to eat? I need to plant them."
(...), and they will plant them [GM crops]. They won't look for other alternatives." (4-7)

One strategy to "justify" the possibility of planting GM crops even if there were proof of the risks was to say that each social stakeholder has a different role in society and that the main role of farmers is to sow:

"It is, that's right. As producers, this is beyond our remit. We grow [GM crops] not because they are in fashion, but because they are more profitable and provide better results. It is up to the State to assess if they are dangerous to health and, if so, they should withdraw them from the market (...) and they will be replaced by something else. But this is out of our reach, there is nothing we can do." (2-6)

It should be pointed out that in different cases, the decision to continue producing genetically modified crops, even with proof of the risks or bans, is also presented as a consequence of its context and as the only available alternative. In this regard, the following dialogue is clear:

"Maybe I'm being a bit dramatic... The thing is that we know that... they are messing up the environment, but there is no other option. Here in Gualaguay, for example, 30% of the population works for xxxx [name of a local company] and everyone knows that it is contaminating the river." (5-4)

"Yes, producers know what should be done to preserve the soil. Business is... well, everything is steered by the economic policy set by the government for the sector, so what counts most for the decision is the cost." (5-1)

Nevertheless, we also find those that agree that economic aspects have the most bearing on the decision for the majority of farmers but who are against this position:

"I don't share this point of view that "everything is done in the name of economic profit". (...) I know what we can do to get more profit; I've just decided not to." (2-4)

Some participants also expressed the view that the decision whether to plant GM crops is not based on proof of the risks or on the government's legal measures but actually

on whether a consumer market exists for the genetically modified crops. In this regard, some of the farmers said that they would stop growing GM plants if there was no way to sell them.

Social stakeholders that benefit from GM crops

The question of which social stakeholder(s) (small farmers or national/multinational biotechnology industries) benefit the most from GM crops provoked controversy in the groups. The majority stressed that there was no doubt that the major companies benefit most and at the expense of the others. According to the accounts, these “others” are mainly small farmers and/or society as a whole. Society is deemed to be affected, for instance, when potential health risks are covered up so as to protect profits:

“There are some companies that are analyzing the damage transgenic products may or may not cause, but a big company like Monsanto avoids releasing this information to the public... And, yes, there are problems for the environment and human beings...” (5-5)

The payment of royalties was also referred to as a source of profit for some, i.e., for the company with a captive market:

“Monsanto is the one with the patent and for this reason they have a stranglehold on virtually everyone that uses soy. (...) Firstly, they want to sell you the technology (...) when you are already dependent on the technology, they start demanding you pay royalties. The problem is that when you become a prisoner to this technology... there is no other option... (...) when the technology is widespread... When you are a captive producer, for the company, it's like having the profit already (...) they are making money out of the producer.” (5-1)

Furthermore, it was stressed that the trend towards financial speculation is another factor benefitting large companies but not small farmers:

“From what I know about transgenics, in the case of soy, I agree that it is easier to produce, it's cheaper, the crop is versatile, the size and the explosion of soy has been a wonderful thing from a productivity point of view. But it is also correct (...) that there are fewer and fewer small producers. (...) it's easier to grow soy with direct planting methods, it's easier for the *pools de siembra* (large organizers of contract agriculture), which invest capital and don't see this from a production point of view but rather as a financial transaction. Growing soy is a financial transaction. It is seen from a financial point of view, and not from the producers' viewpoint.” (2-4)

The benefits and the high rates of profitability from RR soy make the question of improving the social structure very important. The ongoing exodus from rural properties worsened by the current situation for agricultural farming is a consequence of different producers renting out their own land to the large corporations, as some of the participants identify:

“People that have never lived in rural areas are investing money in the countryside; and on this, those who generally worked in agriculture have to sell up because they pay much more.” (3-6)

“Small farmers (...) are finished with. Yesterday, I was reading a report: 3% of Argentina’s producers plant 70% of the country’s total soy. So you can see what it’s like: the other 97% grow 30% [of the soy].” (3-4)

During the discussions with the groups on soy production, different participants raised concerns about social changes in the countryside. To sum up, the concerns revolved around the rural exodus, the drop in work for agricultural workers and the fact that producers let out their land and, by doing so, are losing their identity and no longer feel like they belong to the land.

Farmers’ participation in the decision-making process

The request to be heard in the decision-making process for questions related to agricultural legislation was common to the groups, although their members considered this situation to be difficult to achieve, partly due to their marginal situation in society:

“They don’t listen to us. The government looks the other way, producers are not engaged.” (3-3)

“They listen to us, but do not pay attention to what we say.” (4-7)

“We should be listened to but we are the last link in the chain...” (1-11)

However, when we asked if they had really tried to intervene in the decision-making process, we were given different answers which can be divided into five general groups: (1) those who think it is important that farmers be heard and, in practical terms, try to participate by going to meetings, demonstrations, etc.; (2) those who agree with the need to be heard but who do nothing in particular to fulfill this objective; (3) those who also agree but don’t know how they could take part; (4) those who think taking part in the decision-making process is not the farmers’ social role, but that of policy makers; (5) those who do not understand what it means to be heard in the decision-making process and who confuse this with receiving what they consider basic needs from the government: electricity, material support, financial incentives, etc. Let us examine these categories in more detail, starting with the final one. The Pereyra group was a clear example of the fifth attitude where participation was associated with support and assistance.

“What we want here is electricity and treated water.” (1-4)

Also in the Pereyra group, the farmers openly vented their feelings about being excluded by the system, of things going from bad to worse as they are not landowners and are, for the most part, foreigners originally from Bolivia:

“We want them to help us, to listen to us!” (1-6)

“We’re not the owners [of the land], maybe that’s why we don’t have a voice or a vote.” (1-1)

“Sometimes we feel like intruders, like people without any rights ...” (1-5).

An alternative way of identifying ways and means of participating, with a more active approach, was reported by the Gualeguay group, for whom the means of participating are created by the farmers themselves and not by government initiative. In this group, as in others, civil society organizations like the Argentinean Agrarian Federation and the Argentinean Rural Confederation are recognized as important channels, although farmers do not agree with the way in which these organizations separate farmers when representing them into groups based on their scale of production. As expected, those who are not affiliated to the Argentinean Agrarian Federation (such as the participants in the Junín and Gualeguay groups) expressed a more critical opinion in terms of the degree to which they feel it represents them in comparison to those who are affiliated (such as in the Villa Ángela and Bragado groups, whose participants were asked to take part in the focal groups by the Federation):

“We may identify with their interests but not with their strategies of fighting for them. Let’s just say (...) they haven’t had much success in drawing attention to our cause. And when there is discontent, everyone should join arms, everyone linked to agriculture and livestock farming, regardless of what scale, otherwise they won’t listen to us...” (5-4)

It should be pointed out, however, that both the subjects who are affiliated to the Argentinean Agrarian Federation and those who are not are skeptical about the tangible results that can be achieved through small farmers taking part. The widespread belief is that “everything is already written or decided”, thereby a means of participation that is not fully materialized or a false idea of participation is created, with only the Argentinean Agrarian Federation able to convey the issues that are of concern to small farmers:

“But at meetings, unfortunately, even though we take part, everything has already been decided before the meeting. We take part to find out what’s going on, but...” (4-4)

The skepticism about being able to exert any influence by taking part at these meetings or demonstrations led some subjects to state that the only way to be heard was to use radical measures:

“To be heard, we have to do what the others do: block the roads! But we can’t leave our jobs!” (1-5)

The same type of uncertainty, even among those who do take part, is also reflected in the perception of to what extent they feel represented by the politicians for whom they vote, in other words, if these politicians pay attention to farmers’ needs when drafting changes or legislation. Different farmers said that the majority of politicians only want to win votes, without making any *de facto* changes to satisfy farmers’ needs.

Final considerations

Since their introduction in the mid-1990s, the production of GM crops in Argentina has increased rapidly. In particular, the extremely fast adoption of RR soy placed the country on the world leader board for soy production and exports. This would suggest that local farmers are satisfied with this innovative technology. Having this type of positive attitude towards soy is not necessarily related to the fact that the soy is genetically modified, but rather to the increased profits from the soy market and the way it dovetails perfectly with direct planting methods. Moreover, the positive view of genetically modified soy has spread to other crops: currently, the majority of the maize and cotton produced in the country is genetically modified.

Although a generally favorable attitude remains after more than a decade, a number of fears were identified surrounding the environmental and social impacts of growing genetically modified organisms. In the former, these include the emergence of herbicide-resistant weeds and problems caused by more intensive agriculture and soy “monoculture”, such as the loss of soil nutrients. Another negative concern is deforestation, mainly in the process known as the “pampeanization” of Argentina: crops that are traditionally grown in the Pampean areas have shifted northwards, causing deforestation and growth in the huge areas occupied by soy monoculture. Among the perceived social impacts is the new social trend spurred on by the aggressive practices of private corporations bent on planting soy on land traditionally belonging to poor families or small farmers, and their contribution towards increasing the concentration of land, the rural exodus and the loss of lay knowledge related to traditional agriculture. Significant differences have emerged among those who use GM crops and those who do not in terms of knowing what this entails and being able to hold a discussion on the subject. However, there is even confusion in the ranks of those who grow GM, such as, for example, on the differences between “transgenics”, “genetic improvement” and “hybrid plants”.

As for the level of knowledge about the potential environmental and social damage or risks, the majority of the sample showed a pragmatic approach: the plants are more profitable and require less work, thus generally there is no major dilemma about grow-

ing them. The generally favorable attitude goes hand-in-hand with other attitudes on transgenic plants, such as the human consumption of genetically modified food or the use of GM technology for research purposes in medicine, provided control procedures and access to clear information are improved.

The majority of participants in our study agreed that they should be heard in the decision-making process for agricultural questions, but also recognized the difficulties in achieving this objective. In fact, there were only a few positive responses when we asked if they had actually tried to be actively involved in some kind of participation mechanism. In some cases, the lack of information on how to take part or their own self-exclusion from decision-making circles were the reasons given for remaining outside the process. In other cases, the lack of participation was clearly related to their own position as small farmers, the “last link in the chain”, which would imply a serious obstacle to them having their voices heard. This attitude acts as a disincentive to a certain extent, except among those who use it as a motive for supporting more radical measures - including the use of force, such as blocking highways –in order to be heard. These were exactly the measures taken in mid-2008, in what became known as the “countryside rebellion”, where the four agricultural producers’ associations in Argentina united and blocked roads in response to export taxes on soy, which affected the food supply and led to the measure being suspended.

Notes

i “(...) Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent degradation” (UNCED, 1992).

ii In 2007, at the time that this study was conducted, Argentina was ranked second worldwide in terms of millions of hectares planted with GM crops (19.1 million), surpassed only by the USA (57.7 million) (James, 2007).

iii Argentina’s wealth is distributed unevenly throughout the country, with, historically, a significant share of economic activity in certain areas (the metropolitan region of Buenos Aires and others, such as Santa Fé and Córdoba).

References

ALMEIDA, C.; MASSARANI, L. O modo de organização argumentativo no discurso de pequenos agricultores sobre cultivos transgênicos. **Diadorim**, v.10, 2011.

ALTIERI, M.; ROSSET, P. Strengthening the case for why biotechnology will not help the Developing World: a response to McGloughlin. **AgroBioForum. The Journal of Agrobiotechnology Management & Economics** v.2, n.3&4, 1999.

ARANCIBIA, F. Controversias científico-regulatorias y activismo: el caso de los agroquímicos para cultivos transgénicos en la Argentina. In: TULA MOLINA, F. y Vara, A. (comps.). **Riesgo, política y alternativas tecnológicas. Entre la regulación y la discusión pública**. Buenos Aires: Prometeo, in press.

ATKINSON, H.; GREEN, J.; COWGILL, S.; LEVESLEY, A. The case for genetically modified crops with a poverty focus. **Trends in Biotechnology**, v.19, n.3, 91-96, 2001.

- BARSKY, O.; DÁVILA, M. **La rebelión del campo. Historia del conflicto agrario argentino**. Buenos Aires: Editorial Sudamericana, 2008.
- BROOKS, S. **Biotechnology and the politics of truth: From the green revolution to an evergreen revolution**. Oxford: Blackwell, 2005.
- CARVALHO, A. **Communicating Climate Change: Discourses, Mediations and Perceptions**, Centro de Estudos de Comunicação e Sociedade, Braga, Universidade do Minho, 2008
- CHIMMIRI, N.; TUDOR, K.W.; SPAULDING, A.D. An analysis of McLean County, Illinois farmers' perceptions of genetically modified crops. **AgroBioForum. The Journal of Agrobiotechnology Management & Economics**, v.9, n.3, p.152-165, 2006.
- DUNWOODY, S.; GRIFFIN, J. Risk communication, risk beliefs and democracy: the case of agricultural biotechnology. In: BROSSARD, D. et al. (eds.), **The public, the media and the agricultural technology**, UK, CABI, 2007.
- DURANT, JOHN; BAUER, MARTIN E GASKELL, GEORGE (eds.) **Biotechnology in the Public Sphere**. London: Science Museum. 308p, 1998.
- FRICKEL, S.; MOORE, K. Prospects and challenges for a new political sociology of science, **The New Political Sociology of Science. Institutions, Networks, and Power**, eds. Frickel, S and Moore, K., Madison, The University of Minnesota Press, p. 3-31, 2006
- GAO - United States General Accounting Office. Report to the Chairman, Subcommittee on Risk Management, Research, and Specialty Crops, **Biotechnology: Information on Prices of Genetically Modified Seeds in the United States and Argentina**, Committee on Agriculture, House of Representatives, Washington, DC, 2000.
- GASKELL, G.; BAUER, M.; DURANT, J.; ALLUM, N. C. Worlds apart? The reception of genetically modified foods in Europe and the US. **Science** 285: 384-387, 1999.
- GUEHLSTORF, C. Understanding the Scope of Farmer Perceptions of Risk: Considering Farmer Opinions on the Use of Genetically Modified (GM) Crops as a Stakeholder Voice. **Policy Journal of Agricultural and Environmental Ethics**, v.21, n.6, p. 541-558, 2008.
- HALL, M., LANGFORD, L. Social Exclusion and Transgenic Technology: The Case of Brazilian Agriculture. **Journal of Business Ethics**, v.77, n1, p. 45-63, 2008.
- HELLER, C. McDonalds, MTV, and Monsanto: Resisting biotechnology in the age of informational capital. **Redesigning Life? The Worldwide Challenge of Genetic Engineering**, ed. Tokar, B., London, Zed Books, 2001. Available at: <<http://www.social-ecology.org/learn/library/heller/monsanto>>.
- JAMES, C. **Global Status of Commercialized Biotech/GM crops: 2011 – ISAAA Briefs n. 43**, Ithaca: ISAAA, 2011.
- JASANOFF, S. Biotechnology and empire: The global power of seeds and science, **Osiris**, v.21, p. 273-292, 2006.
- KITZINGER, Jenny. The Methodology of Focus Group: the Importance of interaction between research participants. **Sociology of Health & Illness** 16(1): 103-121, 1994.

- KITZINGER, Jenny. Introducing focus group. **BMJ** 311: 299-302, 1995.
- MASSARANI, L.; MOREIRA, Ildeu. Attitudes towards genetics: a case study among Brazilian high school students. **Public Understanding of Science**, London, v. 14, n.2, p. 201-212, 2005.
- McGLOUGHLIN, M. Ten reasons why biotechnology will be important in the developing world. In: SHERLOCK, N., MORREY, J. (Eds.), **Ethical issues in biotechnology**. Maryland: Rowman & Littlefield Publishers, 1999.
- MIROWSKY, P. y SENT, E-M. The commercialization of science and the response of STS, **Handbook of Science and Technology Studies**, third edition, eds. Hackett, E. J. et al., Cambridge, The MIT Press, p. 635-689, 2008.
- MORGAN, D. **Focus groups as qualitative research**. Thousand Oaks: Sage Publications, 1997.
- MUCCI, A., HOUGH, G. Perceptions of genetically modified foods by consumers in Argentina, **Food Quality and Preference**, v.15, n.1, p.43-51, 2004.
- PENNA, J., LEMA, D. Adoption of herbicide tolerant soybeans in Argentina: an economic analysis. In KALITZANDONAKES, N. (ed.) **The Economic and Environmental Impacts of Agrobiotechnology. A global Perspective**. New York: Kluwer Academic, 2003. p. 203-221.
- POLINO, C., FAZIO, ME. La opinión pública de los argentinos sobre los organismos genéticamente modificados. El caso de la soja transgénica. In: Dirección de Relaciones Internacionales-SECYT (eds.). **Argentina-Brasil. Hacia un nuevo contrato entre Ciencia, Tecnología y Sociedad**. Buenos Aires: Ministerio de Educación, Ciencia y Tecnología, 2005.
- PRIEST, Susanna Hornig. US Opinion divided over biotechnology? **Nature Biotechnol.** 18: 939-942, 2000. PRIEST, Susanna Hornig. **A grain of truth – The media, the public, and the biotechnology**. Boston & Oxford: Rowman & Littlefield Publishers Inc. 141p., 2001.
- QAIM, M., TRAXLER, G. Roundup ready soybeans in Argentina: farm level and aggregate welfare effects. **Agricultural Economics**, n.32, p. 73-86, 2005.
- SAGPyA. **Consultas sobre la biotecnología en la Argentina**. Proyecto SAGPyA / UNEP GEF, Buenos Aires, 2003.
- SECYT. **Los argentinos y su visión de la ciencia y la tecnología**. Buenos Aires: Ministerio de Educación, Ciencia y Tecnología, 2004.
- STONE, G.D. Social Constraints on Crop Biotechnology in Developing Countries. **AgroBioForum. The Journal of Agrobiotechnology Management & Economics**, v.7, n.1&2, 2004.
- STIRLING, A. "Risk, precaution and science: towards a more constructive policy debate", **EMBO Reports**, 8:4, 309-315, 2007.
- TRIGO, E.J., CAP, E.J. The impact of the introduction of transgenic crops in Argentinian

agriculture, **AgroBioForum. The Journal of Agrobiotechnology Management & Economics**, v.6, n.3, p.87-94, 2003.

VARA, A. Transgénicos en Argentina: más allá del *boom* de la soja, **Revista CTS**, n.3, v.1, 2004. VARA, A., PIAZ, A., ARANCIBIA, F. Biotecnología agrícola y 'sojización' en la Argentina: controversia pública, construcción de consenso y ampliación del marco regulatorio. **Política & Sociedade**, Florianópolis, v. 11, n. 20, pp. 135-170, April 2012.

Submitted on: 24/11/2012

Accepted on: 01/08/2013

WHAT DO SMALL FARMERS IN ARGENTINA THINK ABOUT GENETICALLY MODIFIED CROPS?

LUISA MASSARANI, CARMELO POLINO, CARINA CORTASSA,
MARÍA EUGENIA FAZIO, ANA MARÍA VARA

Abstract: Over the last fifteen years, Argentina has become one of the world's biggest producers and exporters of genetically modified (GM) crops. Different social stakeholders have debated issues related to GM crops such as, among others, the environmental risks, economic advantages and disadvantages, and increased inequality between large and small farmers. However, small farmers have largely remained absent from the discussion. This article presents the results of a study using focus groups on Argentinian small farmers' perceptions and attitudes towards GM crops. The results suggest that local farmers are satisfied with the new technology but also have fears concerning the environmental and social impacts of genetically modified crops and organisms.

Key words: Genetically modified crops; Farmers; Public perception; Argentina

Resumo: Ao longo dos últimos quinze anos, a Argentina tornou-se um dos maiores produtores e exportadores mundiais de cultivos geneticamente modificados (GM). Neste processo, questões como riscos ambientais, vantagens e desvantagens econômicas, a intensificação das desigualdades entre grandes e pequenos agricultores, entre outras, têm sido debatidas por diversos atores sociais. No entanto, os pequenos agricultores permanecem, em grande parte, ausentes da discussão. Neste artigo, são apresentados os resultados de um estudo utilizando grupos focais, sobre a percepção e as atitudes dos pequenos agricultores argentinos em relação aos cultivos GM. Os resultados sugerem satisfação dos agricultores locais com a nova tecnologia, mas também receios quanto aos impactos ambientais e sociais do cultivo de organismos geneticamente modificados.

Palavras-chave: Cultivos geneticamente modificados; Agricultores; Percepção pública; Argentina

Resumen: En los últimos quince años, la Argentina se transformó en uno de los más grandes productores y exportadores mundiales de cultivos genéticamente modificados (GM). En este proceso, cuestiones como riesgos ambientales, ventajas y desventajas económicas, la intensificación de las desigualdades entre productores industriales y pequeños productores,

entre otras, han sido debatidas por diversos actores sociales. Sin embargo, los pequeños agricultores permanecen, en gran parte, ausentes de la discusión. En este artículo, son presentados los resultados de un estudio utilizando grupos focales, sobre la percepción y las actitudes de los pequeños agricultores argentinos en relación a los cultivos GM. Los resultados sugieren satisfacción de los agricultores locales con la nueva tecnología, pero también preocupaciones en cuanto a los impactos ambientales y sociales de los cultivos de organismos genéticamente modificados.

Palabras-clave: Cultivos genéticamente modificados; Agricultores; Percepción pública; Argentina
